HYDROCHLORIC ACID DPM 939

Product Safety Information

HYDROCHLORIC ACID
(Muriatic Acid)

CAS NO. 7647010

This Product Safety Information Sheet is principally directed to managerial, safety, hygiene and medical personnel. The description of physical, chemical and toxicological properties and handling advice is based on past experimental results and past experience. It is intended as a starting point for the development of safety and health procedures.

I. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Composition: HCl (Aqua)
Formula Weight: 36.46 (Solute)
Physical State: Liquid (20°C/68°F–14.7 psia)
Specific Gravity of Liquid: 1.1417 to 1.1789 (water: 1.0)
(concentration: 27.92%–35.21% HCl)
Boiling Point: 110°C/230°F–20.25% HCl
Melting Point: –46.2°C/–51.2°F at 31.24% HCl
–62.25°C/–80°F at 20.69% HCl
Flash Point: Nonflammable
Water Miscibility: Complete
Color: Clear, colorless to slightly yellow
Odor: Sharp, pungent, irritating
Vapor Pressure (mmHg) 32% HCl:
0°C/32°F: 5.7
21.1°C/70°F: 25.8
37.7°C/99.9°F: 72.6
Solubility: Soluble in water, alcohols, and aldehydes

II. CHEMICAL REACTIVITY

Hydrochloric acid reacts with various metals and metal oxides, and with hydroxides to form the chlorides. It decomposes the zeolites, slags, and many other siliceous materials to yield silicic acid; reacts with carbonates, liberating CO_2 and H_2O and is oxidized in the presence of oxygen and catalyst, or by electrolysis, to produce chlorine. HCl neutralizes alkaline solutions and acts as a hydrolyzing agent for carbohydrates, esters and other chemicals. It liberates free acids from soaps and salts.

III. STABILITY

Hydrochloric acid will yellow upon exposure to iron, chlorine or organic substances. It has slight evidence of dissociation at temperatures above 1500°C/2732°F. It is a relatively stable compound and with water it forms a maximum boiling azeotrope that boils at 108.58°C/227.5°F at 1 atm and contains 20.22% HCl.

IV. FIRE HAZARD

Hydrochloric acid is a nonflammable substance in the air, but if it is allowed to come in contact with various metals, its corrosive nature will cause a reaction and hydrogen will be evolved. This can develop into a dangerously explosive situation in combination with the air.

V. FIREFIGHTING TECHNIQUE

Vapors are extremely irritating to the respiratory tract and may cause breathing difficulty and pulmonary edema.

Prevent human exposure to fire, smoke, or fumes. Evacuate nonessential personnel from the fire area.

Wear full-face, self-contained breathing apparatus and impervious clothing (such as gloves, hoods, suits and rubber boots).

Use water, soda ash, slaked lime, carbon dioxide, or dry chemical extinguishing agents. If containers are not leaking, keep cooled with a water spray.

VI. TOXICOLOGY

Hydrogen chloride, both as a gas and in solution as hydrochloric acid, is a corrosive substance and can cause severe and painful burns on contact with any part of the body or if taken internally. The mucous membranes of the eyes and the upper respiratory tract are especially susceptible to the irritating effects of high atmospheric concentrations of hydrogen chloride. The gas or vapor is so penetrating and pungent that when high concentrations do occur, those exposed should immediately leave the contaminated area.

Ingestion
When concentrated hydrochloric acid is swallowed, it causes severe burns of the mucous membranes of the mouth, esophagus and stomach. The lips and mouth usually turn white, and later brown. There is pain in the throat and stomach, difficulty in swallowing, intense thirst, nausea and vomiting, followed by diarrhea and, in severe cases, by collapse and unconsciousness.

Eye Contact
Contact of the eyes with hydrogen chloride, either as a gas or in solution, rapidly causes severe irritation and painful burns of the eyes and eyelids. If the acid is not

In case of suspected hydrochloric acid poisoning, refer to the procedure and emergency contacts in Section VII—FIRST AID.

In case of spillage, refer to procedure and emergency contacts in Section IX—SPILL HANDLING.

In case of animal poisoning, call a veterinarian or call collect, day or night, (203) 226-6602 (Stauffer Chemical Company) or (800) 424-9300 (Chemtrec).

In case of contamination of other materials with Hydrochloric Acid call (800) 424-9300 (Chemtrec).

Stauffer CHEMICALS
STAUFFER CHEMICAL COMPANY
INDUSTRIAL CHEMICAL DIVISION
Westport, Connecticut 06880

quickly removed by thorough irrigation with water, there may be prolonged or permanent visual impairment or total loss of sight.

Skin Contact
Concentrated solutions are destructive to clothing and, on contact with skin, cause severe burns unless promptly washed off. Repeated skin contact with dilute solutions may lead to the development of dermatitis. Exposure to the concentrated vapor of anhydrous hydrogen chloride may also result in burns or dermatitis.

Inhalation
Inhalation of excessive concentrations of hydrogen chloride vapors immediately produces severe irritation of the upper respiratory tract, resulting in coughing, burning of the throat, and a choking sensation. Reactions encountered in man have usually been limited to inflammation and occasional ulceration of the nose, throat and larynx. If inhaled deeply, edema of the lungs may occur.

Threshold Limit Value (TLV)
The American Conference of Governmental Industrial Hygienists has assigned a TLV of 5 ppm (7 mg/m^3) by volume in air as the maximum allowable concentration of hydrogen chloride vapor for exposures not exceeding a total of eight hours daily.

VII. FIRST AID

CALL A PHYSICIAN IMMEDIATELY

If a known exposure occurs or is suspected, immediately initiate the recommended procedures below. Simultaneously contact a physician, the nearest hospital, or the nearest Poison Control Center. Inform the person contacted of the type and extent of exposure, describe the victim's symptoms and follow the advice given. For additional information, call collect, day or night, Stauffer Chemical Company (203) 226-6602 or Chemtrec (800) 424-9300.

Ingestion
Do *NOT* induce vomiting. Immediately give large quantities of water. If vomiting does occur, give fluids again. Never give anything by mouth to an unconscious person. Call a physician or the nearest Poison Control Center immediately.

Eye Contact
Immediately flush the eyes with large quantities of running water for a minimum of 15 minutes. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eyes and lids with water. Do not attempt to neutralize with chemical agents. Obtain medical attention as soon as possible. Oils or ointments should not be used. Continue the flushing for an additional 15 minutes if the physician is not immediately available.

Skin Contact
Immediately remove contaminated clothing under a safety shower. Flush all affected areas with large amounts of water for at least 15 minutes. Do not attempt to neutralize with chemical agents. Obtain medical advice immediately.

Inhalation
Remove from contaminated atmosphere. If breathing has ceased, clear the victim's airway and start mouth-to-mouth artificial respiration, which may be supplemented by the use of a bag-mask respirator, or a manually-triggered, oxygen supply capable of delivering 1 liter/second or more. If the victim is breathing, oxygen may be administered from a demand-type or continuous-flow inhalator, preferably with a physician's advice. Contact a physician immediately.

VIII. INDUSTRIAL HYGIENE

Ingestion
All food should be kept in a separate area, away from the working location. Eating, drinking, smoking and carrying of tobacco products should be prohibited in areas where there is a potential for exposure to the product. Before eating, hands and face should be thoroughly washed.

Inhalation
This material should only be handled in open areas. Where adequate ventilation is not available and there is a possibility of vapor, aerosol or mist generation, control of inhalation exposures can be achieved through the use of a NIOSH-approved full-face piece, cartridge, air-purifying respirator.

Dermal Contact
Dermal contact and exposure should be prevented through the use of impervious clothing, gloves, footwear and a face shield where splattering of the material may occur.

Eye Contact
Eye contact should be prevented through the use of chemical safety glasses, goggles, or a face shield.

IX. SPILL HANDLING

Make sure all personnel involved in the spill cleanup follow good industrial hygiene practices (refer to Section VIII). Use adequate ventilation and wear a respirator to prevent inhalation contact. Wear protective clothing to prevent skin and eye contact. Use the following procedures:

Spills should be handled immediately by neutralizing and flushing the area with large amounts of water. The neutralizing agents suggested are soda ash or lime. If soda ash is used, ample ventilation should be provided.

Equipment lines should be flushed with water or an alkaline solution after use and an alkaline solution before maintenance. This procedure should be practiced according to the recommendations of the Manufacturing Chemists Association, Inc.

Large spills should be handled according to a predetermined plan. For assistance in developing a plan, contact the Technical Service Department, Industrial Chemical Division, Stauffer Chemical Company, Westport, CT 06880.

IN CASE OF EMERGENCY, CALL, DAY OR NIGHT
(800) 424-9300 (CHEMTREC)

X. CORROSIVITY TO MATERIALS OF CONSTRUCTION

Hydrochloric acid is highly corrosive to most metals with the evolution of hydrogen gas, which is highly explosive when mixed with air.

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XI. STORAGE REQUIREMENTS

The following safety facilities should be readily accessible in all areas where hydrochloric acid is handled or stored:

Safety Showers—with quick opening valves which stay open. Water should be supplied through insulated lines to prevent freeze-ups in cold weather.

Eye Wash Fountain—or other means of washing the eyes with gentle flow of tap water.

Storage should be located outdoors or in well-ventilated areas whenever possible. Storage tanks should be vented with an adequately sized acid resistant pipe to the atmosphere at an elevation higher than the surroundings.

All containers should be stored away from highly flammable substances such as oil, gasoline, paint waste and other potential fire hazards; also away from elevators, gangways, and all locations where moving objects may fall upon them. Store away from oxidizing agents such as nitric acid and chlorates. Do not store near heating devices or in direct sunlight.

Storage capacity should be adequate enough to allow complete emptying of the tank truck plus an additional 25% allowance. Rubber lined steel tanks have been found to be the most satisfactory.

XII. DISPOSAL OF UNUSED MATERIAL

For assistance in disposing of unused material, contact the Technical Service Department, Industrial Chemical Division, Stauffer Chemical Company, Westport, CT 06880.

XIII. REFERENCES

Hydrochloric Acid., Manufacturing Chemists Association, Inc., SD-39 1970.

Mark, H.F., McKetta, John J., Jr., Othmer, Donald F., and Standen, A., **Kirk-Othmer Encyclopedia of Chemical Technology.** 2nd ed. New York: Interscience Publishers, Inc. 1963.

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